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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/762,789	01/22/2004	Douglas G. Anderson	039035/267930	6124
826	7590	06/07/2006	EXAMINER	
ALSTON & BIRD LLP BANK OF AMERICA PLAZA 101 SOUTH TRYON STREET, SUITE 4000 CHARLOTTE, NC 28280-4000			KALAM, ABUL	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 06/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/762,789

Applicant(s)

ANDERSON, DOUGLAS G.

Examiner

Abul Kalam

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) 14-26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>1/22/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I, claims 1-13, in the reply filed on May 1, 2006 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Objections

2. Claims 2-5, 7-10, and 12-13 are objected to because of the following informalities:

The limitation "a wafer" in line 1 of claims 2-5 should be amended to "the wafer" because the limitation has already been claimed in line 1 of claim 1, and thus antecedent basis has already been provided.

The limitation "an intermediate wafer assembly" in line 1 of claims 7-10 should be amended to "the intermediate wafer assembly" because the limitation has already been claimed in line 1 of claim 6, and thus antecedent basis has already been provided.

The limitation "an intermediate wafer assembly" in line 1 of claims 12-13 should be amended to "the intermediate wafer assembly" because the limitation has already been claimed in line 1 of claim 11, and thus antecedent basis has already been provided.

The limitation, "that portion," in line 2 of claim 4 and line 3 of claim 8 lacks antecedent basis. Is the claimed "that portion" referring to the "medial portion"

Art Unit: 2814

described in claims 3 and 7, respectively, or is it referring a portion of the substrate or wafer, respectively, having the largest diameter. The office will interpret "that portion" to mean a portion of the substrate or wafer, respectively, having the largest diameter.

The limitations, "the major surface opposite the interface" and "the major surface proximate the interface," in lines 1-3 of claim 10 are unclear, because the claim does not specify whether the major surface in each limitation is referring to the surfaces of the handle wafer or bonded wafer or both of the wafers. The office will interpret that the limitations "major surface" to be referring to surfaces the bonded wafer.

Appropriate correction is required of all the informalities.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by Sumnitsch et al. (US 6,162,739).

With respect to claim 1, Sumnitsch teaches (fig. 6) a wafer comprising:

Art Unit: 2814

a substrate (1) having opposed first and second major surfaces (top and bottom surfaces) and a peripheral edge (3) extending therebetween, wherein a cross-sectional profile of the edge comprises:

an angled edge segment (6) adjacent the first major surface that extends linearly at a predefined angle relative to a reference plane defined by the first major surface;

and a curved edge segment (7 and 8) that defines a continuous curve extending from the angled edge segment to the second major surface (col. 4, Ins. 14-22).

With respect to claim 2, Sumnitsch teaches the wafer as set forth above in claim 1, wherein the curved edge segment comprises a radiused surface (7 and 8) extending from the angled edge segment to the second major surface (fig. 6).

With respect to claim 3, Sumnitsch teaches the wafer as set forth above in claim 1, wherein the second major surface (bottom surface) has a smaller diameter than a medial portion of said substrate between said first and second major surfaces (fig. 6).

4. Claims 1-3 and 5 are rejected under 35 U.S.C. 102(e) as being anticipated by Kim et al. (US 2004/0041143).

With respect to claim 1, Kim teaches (fig. 2) A wafer comprising:

a substrate having opposed first (bottom surface) and second (top surface) major surfaces and a peripheral edge extending therebetween, wherein a cross-sectional profile of the edge comprises:

an angled edge segment (EP2_{out}, linear segment) adjacent the first major surface (bottom surface) that extends linearly at a predefined angle relative to a reference plane defined by the first major surface; and

a curved edge segment (EP2_{out}, curved segment) that defines a continuous curve extending from the angled edge segment to the second major surface (top surface).

With respect to claim 2, Kim teaches (fig. 2) the wafer as set forth above in claim 1, wherein the curved edge segment comprises a radiused surface (EP2_{out}, curved segment) extending from the angled edge segment (EP2_{out}, linear segment) to the second major surface (top surface).

With respect to claim 3, Kim teaches the wafer as set forth above in claim 1, wherein the second major surface (top surface) has a smaller diameter than a medial portion of said substrate between said first and second major surfaces (fig. 2).

With respect to claim 5, Kim teaches (fig. 2) the wafer as set forth above in claim 1, wherein the first major surface (bottom surface) has a smaller diameter than a diameter of the second major surface (top surface).

5. Claims 6 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Ito et al. (US 5,340,435).

With respect to claim 6, Ito teaches an intermediate wafer assembly (fig. 1) comprising:

a handle wafer (10); and

a bonded wafer (12) attached to said handle wafer, wherein said handle wafer and said bonded wafer each include a respective edge (18 and 20) extending peripherally thereabout, and wherein the edge of each respective wafer defines a radiused surface that extends continuously to an interface between said handle and bonded wafers (col. 2, Ins. 1-3).

With respect to claim 7, Ito teaches the intermediate wafer assembly as set forth above in claim 6, wherein each wafer comprises opposed major surfaces, and wherein the major surface of each wafer that is proximate the interface has a smaller diameter than a medial portion of the respective wafer between the opposed major surfaces (fig. 1).

6. Claims 6-7 and 9-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Abe et al. (US 6,583,029).

With respect to claim 6, Abe teaches an intermediate wafer assembly (fig. 1 and fig. 7(g')) comprising:

a handle wafer (2); and

a bonded wafer (1) attached to said handle wafer, wherein said handle wafer and said bonded wafer each include a respective edge extending peripherally thereabout, and wherein the edge of each respective wafer defines a radiused surface that extends continuously to an interface between said handle and bonded wafers.

Fig. 7(g') shows that both the handle wafer (2) and bonded wafer (1) have curved surfaces (described by the applicant in fig. 5 as a "polishing sag") that extend continuously to an interface between the handle and bonded wafers.

With respect to claim 7, Abe teaches teaches the intermediate wafer assembly as set forth above in claim 6, wherein each wafer (1 and 2) comprises opposed major surfaces, and wherein the major surface of each wafer that is proximate the interface has a smaller diameter than a medial portion of the respective wafer between the opposed major surfaces (fig. 7(g')).

With respect to claim 9, Abe teaches (fig. 7(g')) the intermediate wafer assembly as set forth above in claim 6, wherein each wafer comprises opposed major surfaces, and wherein a cross-sectional profile of the edge of each respective wafer also includes an angled edge segment, adjacent the major surface opposite the interface, that extends linearly at a predefined angle relative to a reference plane defined by the respective major surface.

With respect to claim 10, Abe teaches (fig. 1 and fig. 7(g')) the intermediate wafer assembly as set forth above in claim 9, wherein the major surface opposite the interface has a smaller diameter than a diameter of the major surface proximate the interface (as best interpreted by the office).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2814

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim ('143) as applied to claims 1 and 3 above.

With respect to claim 4, Kim teaches the wafer of claims 1 and 3 above, including wherein the diameter of the second major surface ("top surface") is smaller than a diameter of a portion of the substrate between the first and second major surfaces (fig. 2).

Thus, Kim is shown to teach all the features of the claim with the exception of explicitly disclosing: wherein the diameter of the second major surface is between 100 microns and 300 microns smaller than a diameter of the portion of a portion of the substrate having the largest diameter.

However, note that the specification contains no disclosure of either the *critical nature of the claimed* "diameter of the second major surface is between 100 microns and 300 microns smaller than a diameter of the portion of a portion of the substrate having the largest diameter," or any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Why is this range, "between 100 and 300 microns," of the diameter critical to the invention?

8. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abe ('029) as applied to claims 6 and 7 above ('143).

With respect to 8, Abe teaches the intermediate wafer assembly of claims 6 and 7, including wherein the diameter of the major surface of each wafer that is proximate the interface is smaller than a diameter of a portion of the respective wafer having the largest diameter (fig. 7(g')).

Thus, Abe is shown to teach all the features of claim 8, with the exception of explicitly disclosing: wherein the diameter of the major surface of each wafer that is proximate the interface is between 100 microns and 300 microns smaller than a diameter of a portion of the respective wafer having the largest diameter.

However, note that the specification contains no disclosure of either the *critical nature of the claimed* "diameter of the major surface of each wafer that is proximate the interface is between 100 microns and 300 microns smaller than a diameter of a portion of the respective wafer having the largest diameter," or any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Why is this range, "between 100 and 300 microns," of the diameter critical to the invention?

9. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al. (US 5,152,857) in view of Kurita et al. (US 6,900,522).

With respect to claim 11, Ito teaches an intermediate wafer assembly (fig. 1(B) and fig. 2) comprising:

a handle wafer (21a) ; and

a bonded wafer (21b) attached (21c) to said handle wafer, said bonded wafer having a first major surface ("front side") facing away from said handle wafer, a second major surface ("back side") proximate said handle wafer, and a peripheral edge extending between the first and second major surfaces, wherein a cross-sectional profile of the edge comprises:

a first angled edge segment (32a) adjacent the first major surface that extends linearly at a predefined angle relative to a reference plane defined by the first major surface;

a second angled edge segment (32b) adjacent the second major surface that extends linearly at a predefined angle relative to a reference plane defined by the second major surface, wherein the second angled edge segment is at least 50% smaller (fig. 1(B)) in a radial direction than the first angled edge segment such that the diameter of the second major surface is correspondingly larger than the diameter of the first major surface (col. 4, Ins. 56-67; col. 5, Ins. 1-67; col. 6, Ins. 1-5);

Furthermore, with regard to claim 11, note that the specification contains no disclosure of either the *critical nature of the claimed*, "second angled edge segment is at least 50% smaller in radial direction than the first angled edge segment," or any

unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Thus, Ito is shown to teach all the features of the claim with the exception of disclosing: a curved edge segment that defines a continuous curve extending between the first and second angled edge segments.

However, Kurita teaches a semiconductor wafer (figs. 1 and 2) wherein a curved edge segment (22) defines a continuous curve between the first and second angled edge segments (col. 1, lns. 19-31).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the wafer assembly of Ito to include a curved edge between the angled segments, as taught by Kurita for the disclosed intended purpose of preventing cracking or chipping from occurring in the periphery of the wafer, and thus lower the cost of manufacturing semiconductor devices (col. 1, lns. 31-36).

With respect to claim 12, Ito and Kurita teach the intermediate wafer assembly as set forth above in claim 11, and Kurita further teaches wherein the curved edge segment of the bonded wafer comprises a radiused surface (22) extending between the first and second angled edge segments (figs. 1 and 2).

10. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ito ('857) and Kurita ('522) as applied to claim 11 above, and further in view of Abe ('029).

With respect to claim 13, Ito and Kurita teach the intermediate wafer assembly as set forth above in claim 11.

Ito further teaches that the handle wafer (21a) also has a first major surface facing away from said bonded wafer,

a second major surface proximate said bonded wafer, and a peripheral edge extending between the first and second major surfaces (fig. 2),

wherein a cross-sectional profile of the edge comprises:

a first angled edge segment (31b) adjacent the first major surface that extends linearly at a predefined angle relative to a reference plane defined by the first major surface (fig. 2);

a second angled edge segment (31a) adjacent the second major surface that extends linearly at a predefined angle relative to a reference plane defined by the second major surface.

Kurita discloses a curved segment (22) extending between the first and second angled edge segments.

Thus, Ito and Kurita are shown to teach all the features of the claim with the exception of disclosing:

wherein the second angled edge segment is at least 50% smaller in a radial direction than the first angled edge segment such that the diameter of the second major surface is correspondingly larger than the diameter of the first major surface.

However, Abe teaches an intermediate wafer assembly (fig. 1(a-d), fig. 7(g')) wherein the diameter of the second major surface (1a) of a handle wafer (2) is larger

Art Unit: 2814

than the diameter of the first major surface (1b) of the handle wafer (col. 9, Ins. 50-65; col. 1, Ins. 23-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the wafer assembly of Ito and Kurita, to have a handle wafer wherein the diameter of the second major surface is larger than the diameter of the first major surface, as taught by Abe for the disclosed purpose of preventing cracks and fractures in the wafer assembly (col. 4, Ins. 36-43).

Conclusion

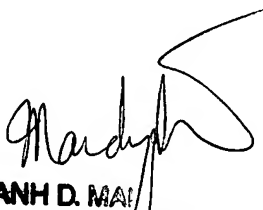
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Abul Kalam whose telephone number is 571-272-8346. The examiner can normally be reached on Monday - Friday, 9 AM - 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2814

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AK



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PRIMARY EXAMINER